

PATENT COOPERATION TREATY

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STATUS OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of Mailing
(day/month/year)

16 APR 2004

Applicant's or agent's file reference

P8917PCT

IMPORTANT NOTIFICATION

International application No.

PCT/US01/29694

International filing date (day/month/year)

20 September 2001 (20.09.2001)

Priority date (day/month/year)

22 September 2000 (22.09.2000)

Applicant

INTEL CORPORATION

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/US

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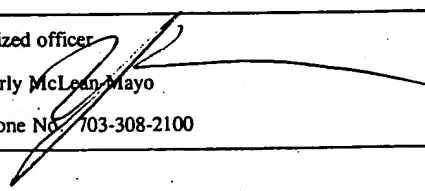
Form PCT/IPEA/416 (July 1992)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P8917PCT	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US01/29694	International filing date (day/month/year) 20 September 2001 (20.09.2001)	Priority date (day/month/year) 22 September 2000 (22.09.2000)	
International Patent Classification (IPC) or national classification and IPC IPC(7): G06F 12/00, 15/00, 1/32; G11C 7/04 and US Cl.: 711/154; 702/132; 713/320; 365/211; 365/226			
Applicant INTEL CORPORATION			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>—</u> sheets.</p> <p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 09 April 2002 (09.04.2002)		Date of completion of this report 05 April 2004 (05.04.2004)	
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230		Authorized officer  Kimberly McLean Mayo Telephone No. 703-308-2100	

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

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I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed.
- ☒ the description:
pages 1-17 as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____
- ☒ the claims:
pages 18-23 as originally filed
pages NONE as amended (together with any statement) under Article 19
pages NONE filed with the demand
pages NONE filed with the letter of _____
- ☒ the drawings:
pages 1-5 as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____
- ☐ the sequence listing part of the description:
pages NONE as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages none
- ☒ the claims, Nos. none
- ☒ the drawings, sheets/fig none

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)

Claims NONE YES

Claims 1-23 NO

Inventive Step (IS)

Claims NONE YES

Claims 1-23 NO

Industrial Applicability (IA)

Claims 1-23 YES

Claims NONE NO

2. CITATIONS AND EXPLANATIONS

Please See Continuation Sheet

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VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the questions whether the claims are fully supported by the description, are made:

Claims 1-6 and 9-16 are objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because the claims are indefinite for the following reason(s): Claim 1 recites the limitation "the number" which lacks antecedent basis.

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

V. 2. Citations and Explanations:

Claims 1, 3-4, 6, 9-13, 15 and 17 lack novelty under PCT Article 33(2) as being anticipated by Bogin et al. (USPN: 5,953,685).

Regarding claim 1, Bogin discloses a system comprising a memory (Figure 1, Reference 104) having a memory bandwidth (C 4, L 16-22; data access rate); a memory controller coupled to the memory (Figure 1, Reference 106; Figure 2A, Reference 106); and masking tool applied to the memory to set a percentage of memory bandwidth or the number of memory accesses allocated to the memory controller (C 4, L 41-45; C 7, L 63-67; C 8, L 1-12).

Regarding claim 3, Bogin discloses a mask applied to the memory controller to decrease memory bandwidth or the number of memory access allocated to the memory controller when memory accesses by the memory controller are more than the memory bandwidth or the number of memory accesses allocated to the memory controller (C 4, L 37-45).

Regarding claim 4, Bogin discloses a first register in the memory controller to set the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller (Figure 3B, Reference 310; C 5, L 46-59); a second register in the memory controller to set a window of time to monitor a percentage of memory bandwidth or the number of memory accesses used by the memory controller (Figure 3B, Reference 300; C 5, L 11-19); and a counter in the memory controller to measure the percentage of memory bandwidth used or the number of memory accesses by the memory controller during the window of time (Figure 3B, Reference 303; C 5, L 19-31).

Regarding claim 6, Bogin discloses a first register in the memory controller to set the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller (Figure 3B, Reference 310; C 5, L 46-59); a second register in the memory controller to set a window of time to monitor a percentage of memory bandwidth or the number of memory accesses used by the memory controller (Figure 3B, Reference 300; C 5, L 11-19); and a counter in the memory controller to measure the percentage of memory bandwidth used or the number of memory accesses by the memory controller during the window of time (Figure 3B, Reference 303; C 5, L 19-31); a mask applied to the memory controller to decrease the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller when the memory accesses by the memory controller are less than the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller (C 4, L 41-45; C 7, L 63-67; C 8, L 1-12).

Regarding claim 9, Bogin discloses counting a number of memory accesses occurring during a first window of time (C 4, L 23-28; C 5, L 19-31; C 9, L 29-32); permitting memory accesses during a second window of time (C 5, L 46-59 - when the number of data transfer within a sampling period/window is less than a threshold, a new sampling period/window is started); and based on the number of memory accesses counted during the first window of time and an allowed number of memory accesses for the first timing window, defining a second allowed number of memory accesses for a second window of time (C 5, L 46-67; C 6, L 45-67; C 7, L 33 - when the number of data transfer within a sampling period/window is greater than a threshold throttling begins, which determines if the

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

maximum QW has been exceeded and if so a access rate [lower] is set up for the second [next] window).

Regarding claim 10, Bogin discloses programming a register (Figure 3B, Reference 3B) in a memory controller to define the first window of time in which to monitor a number of memory accesses (C 5, L 11-17).

Regarding claim 11, Bogin discloses applying a mask to define the first allowed number of memory accesses for the first window of time (C 7, L 63-37; C 8, L 1-12 - when the mask is disabled).

Regarding claim 12, Bogin discloses programming a register (Figure 3B, Reference 300) in a memory controller to define the second window of time comprised of a number of first windows of time in which to specify how long to throttle memory (C 6, L 1-44 - when the throttling time is increased from a previous throttling time).

Regarding claim 13, Bogin discloses applying a mask to define the second allowed number of memory accesses for the second window time (C 4, L 37-45; C 7, L 63-67; C 8, L 1-12 - when the mask is enabled).

Regarding claims 15 and 17, Bogin discloses decreasing the second allowed number of memory accesses for a second window of time with respect to the first allowed number of memory accesses to for the first window of time based on the number of memory accesses counted during the first window of time and the allowed number of memory accesses for the first timing window (C 5, L 46-67; C 6, L 45-67; C 7, L 33 - when the number of data transfer within a sampling period/window is greater than a threshold throttling begins, which determines if the maximum QW has been exceeded and if so a access rate [lower] is set up for the second [next] window)

Claims 2, 5, 7-8, 14 and 16 lack an inventive step under PCT Article 33(3) as being obvious over Bogin (USPN: 5,953,685) in view of Woo (USPN: 6,012,067).

Regarding claims 2, 5, 14 and 16, Bogin discloses the limitations cited above in claims 1 and 9, additionally Bogin discloses a first register in the memory controller to set the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller (Figure 3B, Reference 310; C 5, L 46-59); a second register in the memory controller to set a window of time to monitor a percentage of memory bandwidth or the number of memory accesses used by the memory controller (Figure 3B, Reference 300; C 5, L 11-19); and a counter in the memory controller to measure the percentage of memory bandwidth used or the number of memory accesses by the memory controller during the window of time (Figure 3B, Reference 303; C 5, L 19-31). However, Bogin does not disclose a mask applied to the memory controller to increase the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller when memory accesses by the memory controller are less than the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller. Woo teaches the concept of increasing the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller when memory accesses by the memory controller are less than the percentage of memory bandwidth or the number of memory accesses allocated to the memory controller (C 9, L 60-67; C 10, L 1-10; C 6, L 1-15 - if the temperature [and thus the corresponding operating conditions [bandwidth] of the memory of the device at that instance] is below a threshold, thermal regulation is disabled which effectively increases the memory bandwidth). This feature allows the system to perform optimally when the temperature of the device is within a desired range. Hence it would have been obvious to one of ordinary skill in the art to use the teachings of Woo with the teachings of Bogin for the desirable purpose of optimization and to achieve maximum performance.

Regarding claim 7, Bogin discloses applying a mask to a memory to set a number of memory accesses or a percentage of memory bandwidth allowed during a window of time (C 4, L 37-45; C 7, L 63-67; C 8, L 1-12); counting a number of memory accesses or percentage of memory bandwidth during the window of time (C 4, L 23-28; C 5, L 19-31; C 9, L 29-32); applying a next higher mask (C 7, L 63-37; C 8, L 1-12 - when the mask is disabled). Bogin does not disclose applying the next higher mask to increase the number of memory accesses or percentage of memory bandwidth allowed during the window of time if the number of memory accesses or percentage of memory bandwidth counted during the window of time are fewer than the number of memory accesses or percentage of memory bandwidth allowed for the window of time. However, Woo teaches the concept of increasing the number of memory accesses or percentage of memory bandwidth if the number of memory accesses or percentage of memory bandwidth is fewer than the threshold (C 9, L 60-67; C 10, L 1-10; C 6, L 1-15 - if the temperature [and thus the corresponding operating conditions [bandwidth] of the memory of the device at that instance] is below a threshold, thermal regulation is disabled which effectively increases the memory bandwidth). This feature allows the system to perform optimally when the temperature of the device is within a desired range. Hence it would have been obvious to one of ordinary skill in the art to use the teachings of Woo with the teachings of Bogin for the desirable purpose of optimization and to achieve maximum performance.

Regarding claim 8, Bogin discloses applying a next lower mask (C 7, L 63-37; C 8, L 1-12 - when the mask is disabled). Bogin does not disclose applying the next lower mask to increase the number of memory accesses or percentage of memory bandwidth used allowed during the window of time if the number of memory accesses or percentage of memory bandwidth used counted during the

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window of time are more than the number of memory accesses or percentage of memory bandwidth used allowed for the window of time. However, Woo teaches the concept of increasing the number of memory accesses (refresh memory access) or percentage of memory bandwidth used if the number of memory accesses or percentage of memory bandwidth used are more than the number of memory accesses or percentage of memory bandwidth used allowed for the window of time (C 7, L 24-35; if the temperature [and thus the corresponding operating conditions [bandwidth] of the memory of the device at that instance] is above a threshold, thermal regulation is enabled which effectively increases the memory bandwidth by increasing the refresh rate). This feature taught by Woo provides an efficient means for regulating the thermal properties of the memory and thus it would have been obvious to one of ordinary skill in the art to use the teachings of Woo with the teachings of Bogin for the desirable purpose of efficient thermal regulation.

Claims 18-21 and 23 lack an inventive step under PCT Article 33(3) as being obvious over Bogin (USPN: 5,953,685).

Claims 18-19 are rejected for the same rationale applied to claim 1 above.

Claims 20-21 are rejected for the same rationale applied to claim 4 above.

Claim 23 is rejected for the same rationale applied to claim 3 above.

Additionally, It is well known in the art that functions may be implemented as hardware or software. A system implemented in software can also be implemented in hardware. In this instance, Bogin teaches a hardware implementation. However, implementing the functions performed by Bogin using software is an obvious modification. As it is known in the art that hardware functions may be implemented using software and software/ instructions can be stored on removable mediums, thereby providing portability of the software.

Claims 22 lacks an inventive step under PCT Article 33(3) as being obvious over Bogin (USPN: 5,953,685) in view of Woo (USPN: 6,012,067).

Claim 22 is rejected for the same rationale applied to claim 2 above and additionally, it is well known in the art that functions may be implemented as hardware or software. A system implemented in software can also be implemented in hardware. In this instance, Bogin teaches a hardware implementation. However, implementing the functions performed by Bogin using software is an obvious modification. As it is known in the art that hardware functions may be implemented using software and software/ instructions can be stored on removable mediums, thereby providing portability of the software.

NEW CITATIONS

US 5,953,685 (BOGIN et al.) 14 SEPTEMBER 1999, entire.

US 6,021,076 (WOO et al.) 1 February 2000, entire.